

IN THE CLAIMS

1-10. Cancelled.

11. (New) A method of operating a nuclear reactor, wherein a boiling water reactor is operated while a pH of reactor water in said reactor is controlled on an alkali side and hydrogen is injected in said reactor water, comprising the steps of:

controlling a pH at room temperature of said reactor water to be at a relatively high level in a range of $8.5 < \text{pH} \leq 9$ at the beginning stage of a start-up operation of one operating cycle, and then controlling the pH to be at a relatively low level in a range of $7 < \text{pH} \leq 8.5$ until a shutdown operation; and

controlling a hydrogen concentration of said reactor water to be in a range of 30 to 100 ppb in said operating cycle excluding a short period upon rated operation, and increasing the hydrogen concentration of said reactor water to be in a range of 100 to 200 ppb during said short period upon rated operation.

12. (New) A method of operating a nuclear reactor, wherein a boiling water reactor is operated while a pH of reactor water in said reactor is controlled on an alkali side

and hydrogen is injected in said reactor water, comprising the steps of:

controlling a pH at room temperature of said reactor water to be at a relatively high level in a range of $8.5 < \text{pH} \leq 9$ at the beginning stage of a start-up operation of one operating cycle, and then controlling the pH to be at a relatively low level in a range of $7 < \text{pH} \leq 8.5$ until a shutdown operation; and

controlling a hydrogen concentration of said reactor water to be in a range of 30 to 100 ppb in said operating cycle excluding a portion of a period upon rated operation, and increasing the hydrogen concentration to be a value in a range of 100 to 200 ppb in said portion of the period upon rated operation.

13. (New) A method of operating a nuclear reactor according to claim 11, wherein the pH at room temperature of said reactor water is reduced from said high level to said low level in a period in which the temperature of said reactor water is lower than that upon rated operation.

14. (New) A method of operating a nuclear reactor according to claim 11, wherein the pH at room temperature of said reactor water is controlled at said high level by

injecting a solution or gas, which indicates alkalinity when being dissolved in water, in a reactor primary cooling system.

15. (New) A method of operating a nuclear reactor according to claim 11, wherein an alkali-type cation resin is used for a demineralizer in a condensate system or a reactor water clean up system, and the pH at room temperature of said reactor water is controlled in the range of $7 < \text{pH} \leq 8.5$ by adjusting a concentration of cations leaked from said cation resin.

16. (New) A method of operating a nuclear reactor according to claim 11, wherein the hydrogen concentration controlled in the range of 30 to 100 ppb is controlled in a range of 30 to 65 ppb.

17. (New) A method of operating a nuclear reactor according to claim 11, wherein the hydrogen concentration of said reactor water is increased when a crack growth rate monitored by a crack growth rate sensor provided in said reactor water, or a sampling pipeline connected thereto, becomes larger than a specific value.

18. (New) A method of operating a nuclear reactor according to claim 12, wherein the pH at room temperature of said reactor water is reduced from said high level to said low level in a period in which the temperature of said reactor water is lower than that upon rated operation.

19. (New) A method of operating a nuclear reactor according to claim 12, wherein the pH at room temperature of said reactor water is controlled at said high level by injecting a solution or gas, which indicates alkalinity when being dissolved in water, in a reactor primary cooling system.

20. (New) A method of operating a nuclear reactor according to claim 12, wherein an alkali-type cation resin is used for a demineralizer in a condensate system or a reactor water clean up system, and the pH at room temperature of said reactor water is controlled in the range of $7 < \text{pH} \leq 8.5$ by adjusting a concentration of cations leaked from said cation resin.

21. (New) A method of operating a nuclear reactor according to claim 12, wherein the hydrogen concentration controlled in the range of 30 to 100 ppb is controlled in a range of 30 to 65 ppb.

22. (New) A method of operating a nuclear reactor according to claim 12, wherein the hydrogen concentration of said reactor water is increased when a crack growth rate monitored by a crack growth rate sensor provided in said reactor water, or a sampling pipeline connected thereto, becomes larger than a specific value.